opportunity for a young student to produce a work of absolutely first-class value. It is to be hoped that Dr. Malinowski will be able to publish in full the remainder of his material, which, judging from this sample, will mark a distinct progress in ethnographical research and interpretation. A. C. HADDON.

Pure and Applied Electricity.

(1) *Einführung in die Theorie der Elektrizität und des Magnetismus. Zum Gebrauch bei Vorträgen, sowie zum Selbstunterricht.* Von Prof. Dr. Max Planck. Pp. v+208. (Leipzig: S. Hirzel, 1922.) 42 marks.

(2) *Elettrotecnica elementare con numerosi problemi.* By A. Occhialini. Vol. 1: *Magnetismo—Elettrostatica — Elettrochimica — Elettrodinamica — Elettromagnetismo — Induzione elettromagnetica.* Pp. v+344. (Firenze: Felice Le Monnier, n.d.) n.p.

(3) *Installations électriques industrielles: choix du matériel.* Par R. Cabaud. Pp. 316. (Paris: J.-B. Bailliere et Fils, 1922.) 10 francs.

THE first of these three books discusses the groundwork of the theory of electricity, the next discusses the experimental laws and their laboratory applications, and the third is a severely practical work for the commerical electrician. They are all introductions to the subject, but they are intended for very different classes of readers.

(1) Dr. Max Planck's work is philosophical, and presupposes a knowledge of mathematics and of the mathematical theory of electricity which is possessed by few. The foundations on which the ordinary mathematical equations rest are examined, and particular stress is laid on the units in which they are measured. The Gaussian, the electrostatic, and the electromagnetic systems of units are considered. The work will be very welcome to the pure theorist and will increase his confidence in the soundness of the physical basis of the mathematical theory. The clear distinction made between magnetic force and magnetic induction is very convincing. The experimenter will find little that is directly helpful to him in this book, but he will appreciate, however, the author's method of getting the capacity of an ellipsoid and the deductions that can be made from it.

(2) The second work under notice is very similar to the standard English books on experimental electricity and magnetism. The author's descriptions of the main phenomena are very clear, and the numerous examples given are instructive. A very full discussion is given of the problem of a number of batteries of different electromotive forces and resistances in parallel with one another. A thorough knowledge of this problem is a great help to students when they come to the corresponding problems of dynamos or alternators running in parallel with one another. The definition given of the temperature coefficient of metals, however, is not sufficiently accurate for modern requirements. The rating of a dynamo depends on its temperature after a run at full load, and the temperature of the coils is computed from their measured resistance and a knowledge of the temperature coefficient of copper. As the problem is one of great commercial importance it is necessary to distinguish between the temperature coefficeint of the volume resistivity, the mass resistivity, and the constant mass resistance. These are all different and vary with the lower of the two temperatures considered. The approximate formulæ for the self-induction of a coil are given, but we think that their limitations should have been stated.

(3) M. Cabaud's book is very general and can be appreciated only by a technical expert. It presupposes a thorough knowledge of practical electrical engineering. In the first section of the book a general discussion is given of the kind of electric machine required to do special work; for example, whether a direct-current or an alternating-current machine will be the more useful. In the latter case also the question of whether it is to be single phase or polyphase is considered. The efficiency of the machine, its heating under load, the electric strength of the insulating wrappings, etc., have all to be considered. In the second section the characteristics of the machines, whether rotating or stationary, are described. In the last section the usefulness of the various characteristics are discussed, and the important question of the best guarantees that should be demanded from the manufacturers is considered.

The Petroleum Industry.

(1) *Encyclopédie Scientifique: Bibliothèque de géologie et de minéralogie appliquées: Les Gisements de pétrole.* Par Jean Chautard. Pp. viii+viii+330. (Paris: Gaston Doin, 1922.) 14 fr.

(2) *The Oil Encyclopedia.* By Marcel Mitzakis. Pp. xvi+551. (London: Chapman and Hall, Ltd., 1922.) 21*s.* net.

(3) *The Economics of Petroleum.* By Joseph E. Pogue. Pp. ix+375. (New York: J. Wiley and Sons, Inc.; London: Chapman and Hall, Ltd., 1921.) 33*s.* net.

THE "Encyclopédie Scientifique" constitutes a comparatively new departure in French technical literature, and has for its scope the ultimate publication of some thousand volumes dealing with the various phases of pure and applied science. M. Jean Chautard's little book (1) is apparently one of the earliest of the series, and if it indeed sets the standard of future productions, this encyclopedia will undoubtedly prove of very great value. Well written, profusely illustrated with photographs, maps, plans, diagrams and sections, this particular volume covers a wide subject in a minimum of space. The major part is concerned with the geology of petroleum and a consideration of the petroliferous regions of the world. Other chapters deal with the nature of petroleum, natural gas and solid hydrocarbons, their origin, mode of occurrence, surface manifestations, exploration, and economic development.

The author has drawn on most of the more recent literature for his descriptions of the oil occurrences throughout the world, and in consequence the information given is most up-to-date; several minor errors occur in the spelling of place-names, but these will doubtless be corrected in a future edition. Not the least valuable of the contents of the book are the bibliography, and a noteworthy preface by M. Louis Mrazec, whose structural theories, incidentally, receive careful treatment in the text. At the present time, when scientific books are usually published at prohibitive prices, it is gratifying to be able to recommend a volume which is both an inexpensive and necessary addition to the library of petroleum technology.

(2) In the "Oil Encyclopedia," by Mr. Marcel Mitzakis, we meet with a very different type of book, one which will doubtless make its appeal more to the commercial than to the scientific community. To the many people whose province it is to control the destinies of oil-land development and economics—the administrative as distinct from the technical branch of the industry—this volume will prove of value, presenting as it does the many and varied phases of oil-mining in the form of an elaborate and explanatory index. The volume includes information of a biographical, geological, geographical, and chemical nature, apart from its treatment of the multitudinous technical factors pertaining to the oil industry, and as a source of broad reference to such matters, has much to commend it. It lacks in many cases, however, that atmosphere of authority and degree of accuracy which are to be expected in a work purporting to be for widespread use, and judged from the scientific point of view, leaves much to be desired. In several cases the definitions, especially of geological terms, are decidedly loose, if not actually erroneous, while some of the facts given are by no means correct, nor are they always up-to-date. As examples we may quote the definition of "æolian" given as "a special kind of sand found in oil-bearing strata," and the paragraph devoted to the explanation of the word "Cambrian" since "so many oil strata occur disseminated among Cambrian deposits." Further, the oil potentialities and realities of Great Britain are allotted space out of all proportion to their importance, while the remarks on the natural gas resources of Heathfield, Sussex, though optimistic, are unfortunately incorrect.

No work of this nature could possibly be complete, in the strict sense of the word, unless expanded into many volumes, and had the scope been a little less ambitious, the result would probably have proved far more satisfactory. The biographies could well have been dispensed with, similarly many of the definitions of the more complex chemical compounds, and thus space made available for the inclusion of many terms used in drilling, for example, which are unintelligible to the average non-technical man.

(3) The object of Mr. Joseph Pogue's book is to present, in perspective, the more important economic facts relating to petroleum, and it must be said that the author has certainly achieved his aim. He had every opportunity of producing an enormous compilation of statistics, relieved by a few terse, explanatory paragraphs and deductions, a veritable "blue-book" in fact, dreary, lifeless, and incomprehensible, as publications of that nature are usually wont to be. Instead, the author has given us a work of tangible value, one which seeks only to use past and present facts in order to foreshadow future possibilities.

People to-day are very apt to take things in general, and the petroleum industry in particular, for granted, and ignoring such factors as gradual and universal decline of oil production, more especially in the United States, they are blind to the economic situation which must inevitably be faced. Not only that, they are content to consume oil-fuel and allied products on a peculiarly wasteful scale at the present time, in a manner as complacent as it is incomprehensible to the careful thinker. We recognise in this the basis of Mr. Pogue's book. He says, "The point to be emphasized is the coming necessity for increasing the over-all efficiency of petroleum . . .", and having read that and other important observations made in his excellent preface, we are not surprised at the skilful manner in which he handles his ramified subject. The volume is very readable: indeed, it demands most careful perusal as it takes the reader rapidly from one aspect to another. Beginning with the economic organisation of the industry, it sets before us the salient features of the present trend of oil-field development, oil refinery practice, oil marketing, finance and the bearing of automotive transport on the industry, among other factors, while the chapters on resource situation, international aspects of petroleum, the full utilisation of petroleum, and the function of statistics in the industry, are especially good.

In the space at our disposal, it is impossible to review a work of this nature with justice, and likewise to indulge in that amount of constructive criticism otherwise desired; we would suggest that, in view of its importance as an ultimate source of fuel, considerably more space be devoted to the oil-shale question in future editions, while present refinery practice might with advantage be much more severely criticised, both with regard to technique and design. The author is to be congratulated on the achievement of a remarkably fine work, one that should be widely read by all serious servants of a great industry. H. B. MILNER.

Our Bookshelf.

Memoirs of the Geological Survey. Special Reports on the Mineral Resources of Great Britain. Vol. 20: *Lead and Zinc. The Mining District of North Cardiganshire and West Montgomeryshire.* By Dr. O. T. Jones. Pp. vi+207. (London: H.M. Stationery Office, 1922.) 7*s.* net.

LIKE the three previous volumes dealing with British lead and zinc ores which have been issued by the Geological Survey, it must be admitted regretfully that the present one has a scientific rather than an economic interest. Some of the mines described in the present volume, like Frongoch mine in Cardiganshire and the Van mine in Montgomeryshire, have been extraordinarily productive; the former has been worked for 59 years and the latter for 51 years, and from each more than 100,000 tons of lead and zinc ores have been produced in the course of its career, but in both cases the really productive period was something like half a century ago. The author suggests that it is just possible that these mines might show an improvement by sinking deeper and reaching harder rocks than the soft shales in which they are now bottomed; the prospect, however, is not a very promising one, and the present low price of lead affords no encouragement to spend money on prospecting operations of a highly speculative nature.

The real value of the present work lies in the excellent study of the formation of the faults and fissures and the mode of their filling which Prof. Jones has supplied in the introductory chapters. The first chapter on the general structure of the area gives a very valuable summary of its leading geological features, while the next two chapters are devoted to a discussion of the leading system of fissures to which the district owes its mineral wealth. Finally, the last chapter deals with a number of important points such as the probable age and sources of origin of the ore filling, and the influence upon it of the country rock traversed by the fissures. These chapters form a most valuable contribution to the study of mineral deposition, and from this point of view, quite apart from any possible remote economic possibilities, Prof. Jones's volume deserves the careful attention of the student of mineral deposits. H. L.

Some Scottish Breeding Duck: Their Arrival and Dispersal. By Evelyn V. Baxter and Leonora J. Rintoul. Pp. vii+90. (Edinburgh: Oliver and Boyd, 1922.) 5*s.* net.

THE problems of the increase and extension of range of ducks in Scotland, and in other countries, have long exercised ornithologists throughout the British Isles. As the authors of the volume under notice point out, protection and a better feeling towards and a greater interest in all wild birds are probably important factors in the case but do not explain everything. Certain species other than ducks are as steadily decreasing, and the rise and fall of a species is a complicated biological problem which may have but indirect association with human interference, or may be due entirely to other causes. The recent colonisation of Scotland by other birds, such as the starling, turtle-dove, and great-crested grebe, may be due to the necessity for an over-abundant species to find new areas and the possibilities of settling in an area where raptorial birds and other enemies have been largely destroyed by man's advance and action.

One factor the authors have not stressed, the growing habit of keeping pinioned ornamental fowl, though they mention bird sanctuaries. Passing birds are often "called down" by pinioned fowl, and some of them may elect to mate and breed. That the direction of spread differs in such ducks as the gadwall and wigeon is no argument against this fact, for the source whence come the visitors has no bearing on the influences which cause them to remain. Many pairs of ducks of various kinds have probably nested in out-of-the-way places for years and been overlooked, for it is only within the last thirty years or so that parts of Scotland have been systematically explored from the ornithological point of view. Sportsmen and keepers are not very particular about the species of the ducks which fill their bags.

We note that the authors use the correct spelling of two much-discussed names, wigeon and shoveler.

An Introduction to Engineering Drawing. By J. Duncan. (Life and Work Series.) Pp. x+158. (London: Macmillan and Co., Ltd., 1922.) 4*s.*

THE aim of Mr. Duncan's book is to enable young students of engineering to produce intelligible working drawings of the details of engineering machines and structures. The student is introduced to the proper workmanlike methods of actual engineering practice, and is not allowed the use of any special hybrid methods which are supposed by many to be sufficient for use in schools.

The book commences with a description of drawing instruments, their use and handling; from this, the student is led to the ordinary problems in plain geometry with practical engineering examples such as drawing cams, and plotting small surveys. Afterwards, a little solid geometry introduces the student to oblique and isometric projection, and prepares him for the drawing of engineering details. For this latter portion of the training the author strongly recommends the use of models. A commencement is made with simple fastenings such as bolts and nuts, then the more complicated connexions are dealt with, as exemplified